

ABSTRACT OF THE DISCLOSURE

The molecules and methods of the present invention provide a means for *in vivo* production of a trans-spliced molecule in a selected subset of cells. The pre-trans-splicing molecules of the invention are substrates for a *trans*-splicing reaction between the pre-trans-splicing molecules and a pre-mRNA which is uniquely expressed in the specific target cells. The *in vivo trans*-splicing reaction provides a novel mRNA which is functional as mRNA or encodes a protein to be expressed in the target cells. The expression product of the mRNA is a protein of therapeutic value to the cell or host organism a toxin which causes killing of the specific cells or a novel protein not normally present in such cells. The invention further provides PTMs that have been genetically engineered for the identification of exon/intron boundaries of pre-mRNA molecules using an exon tagging method. The PTMs of the invention can also be designed to result in the production of chimeric RNA encoding for peptide affinity purification tags which can be used to purify and identify proteins expressed in a specific cell type.

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